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Test 492: Farmall Super H

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The Experiment Station
University of Nebraska College of Agriculture
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Department of Agricultural Engineering
Dates of test: April 27 to May 13, 1953.
Manufacturer: INTERNATIONAL HARVESTER CO., CHICAGO, ILLINOIS
Manufacturer's rating: 29.0 Max. drawbar Hp and 33.00 Max. Belt Hp. (corrected to standard conditions.)

NEBRASKA TRACTOR TEST NO. 492

FARMALL SUPER H

FUEL, OIL and TIME Gasoline octane No ASTM 76 Research 82 (rating taken from oil company's typical inspection data); weight per gallon 6.090 lb **Oil** SAE 20; to motor 1.466 gal; drained from motor 1.362 gal; **Total time motor was operated** 39 hours.

CHASSIS TYPE tricycle **Serial No** 1558J **Tread width** rear 48" to 88" front 8⅛", 11½", 13¼", and 16¾" **Wheel Base** 89¼" **Hydraulic control system** driven by clutch **Advertised speeds mph** first 2⅝ second 3¾ third 5 fourth 6⅝ fifth 16¼ reverse 3¼ **Belt pulley** diam 9¾" face 7½" rpm 1019 **Belt speed** 2601 fpm **Clutch** single plate dry disc clutch operated by foot pedal **Seat** upholstered **Brakes** double disc brakes operated by two foot pedals **Equalized** by locking two brake pedals together **Power take-off** standard type.

ENGINE Make International Harvester **Type** 4 cylinder vertical **Serial No** C164 1763 **Crankshaft mounted** lengthwise **Head** I **Lubrication** pressure **Bore and Stroke** 3½" x 4¼" **Rated rpm** 1650 **Compression ratio** 6.1 to 1 **Displacement** 164 cu in **Port Diameter Valves** Inlet 1 11/32" Exhaust 1 7/32" **Governor** variable speed centrifugal **Carburetor Size** 1¼" **Ignition System** battery **Starting System** 6 volt battery **Air Cleaner** oil washed wire mesh **Muffler** was used **Oil Filter** replaceable treated paper element **Cooling medium temperature control** thermostat and shutter.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with carburetor set for 100% maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J, and K were made with an operating setting of the carburetor (selected by the manufacturer) of 93.3% of maximum belt horsepower.

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption: Gal per hour	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hour	Water used gal per hour	Temp Deg F: Cooling med	Temp Deg F: Air	Barometer inches of mercury
TEST B—100% MAXIMUM LOAD—TWO HOURS								
33.40	1650	3.003	11.12	0.548	0.00	193	59	28.850
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR								
31.30	1650	2.677	11.69	0.521	0.00	196	55	28.860
TEST D—RATED LOAD—ONE HOUR								
29.48	1650	2.553	11.55	0.527	0.00	204	58	28.880
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
29.45	1648	2.537	11.61	0.525	...	207	64	.....
1.14	1800	1.010	1.13	5.395	...	206	66	.....
15.66	1746	1.828	8.57	0.711	...	193	68	.....
30.22	1605	2.586	11.69	0.521	...	192	69	.....
7.99	1778	1.414	5.65	1.078	...	197	69	.....
23.04	1716	2.212	10.42	0.585	...	200	70	.....
17.92	1716	1.931	9.28	0.656	...	199	68	28.885

TORQUE (at dynamometer)										
RPM	1650	1545	1445	1347	1254	1147	1046	939	848	750
Lb.-ft.	233.3	237.7	242.7	250.4	257.3	263.2	266.9	265.7	261.3	249.9

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption: Gal per hour	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Water used gal per hour	Temp Deg F: Cooling med	Temp Deg F: Air	Barometer inches of mercury
TEST F—100% MAXIMUM LOAD—THIRD GEAR											
30.69	2385	4.83	1651	4.78	..... Not Recorded				204	40	29.010
TEST G—OPERATING MAXIMUM LOAD											
25.98	4178	2.33	1655	11.40	..... Not Recorded				193	71	28.745
27.53	2905	3.55	1653	6.46	..... Not Recorded				191	65	28.745
27.41	2120	4.85	1652	4.42	..... Not Recorded				194	64	28.730
27.27	1566	6.53	1650	3.26	..... Not Recorded				198	70	28.745
22.23	512	16.28	1649	1.08	..... Not Recorded				197	76	28.740
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
23.48	1807	4.87	1651	3.80	2.286	10.27	0.593	0.00	194	47	29.034
TEST J—OPERATING MAXIMUM LOAD—3rd Gear											
27.14	2153	4.73	1653	7.79	..... Not Recorded				197	46	29.210
TEST K—OPERATING MAXIMUM LOAD—3rd Gear											
26.56	2291	4.35	1653	11.71	..... Not Recorded				185	50	29.180

TIRES, WHEELS, and WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	602 lb each	None	None
Added cast iron	560 lb each	None	None
Rear tires			
No. and size	Two 11-38	Two 11-38	Two 10-38
Ply	6	6	4
Air pressure	18 lb	12 lb	12 lb
Front wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 5.50-16	Two 5.50-16	Two 5-50-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	20 inches	21 inches	19½ inches
Static weight			
Rear end	5240 lb	2916 lb	2856 lb
Front end	1286 lb	1298 lb	1288 lb
Total weight as tested with operator	6701 lb	4389 lb	4319 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F. and 29.92" HG)	31.04	34.61
2. Observed maximum horsepower (tests F & B)	30.69	33.40
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	22.38	29.42

We, the undersigned, certify that this is a true and correct report of official tractor test No. 492.

L. F. LARSEN
Engineer in Charge

C. W. SMITH
L. W. HURLBUT
F. D. YUNG
Board of Tractor Test Engineers

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is held wide oper. and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors, which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads of 20 minutes each: rated load, no load, ½ rated load, maximum load at wide open throttle valve, ¼ and ¾ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.